

# A status update from system side

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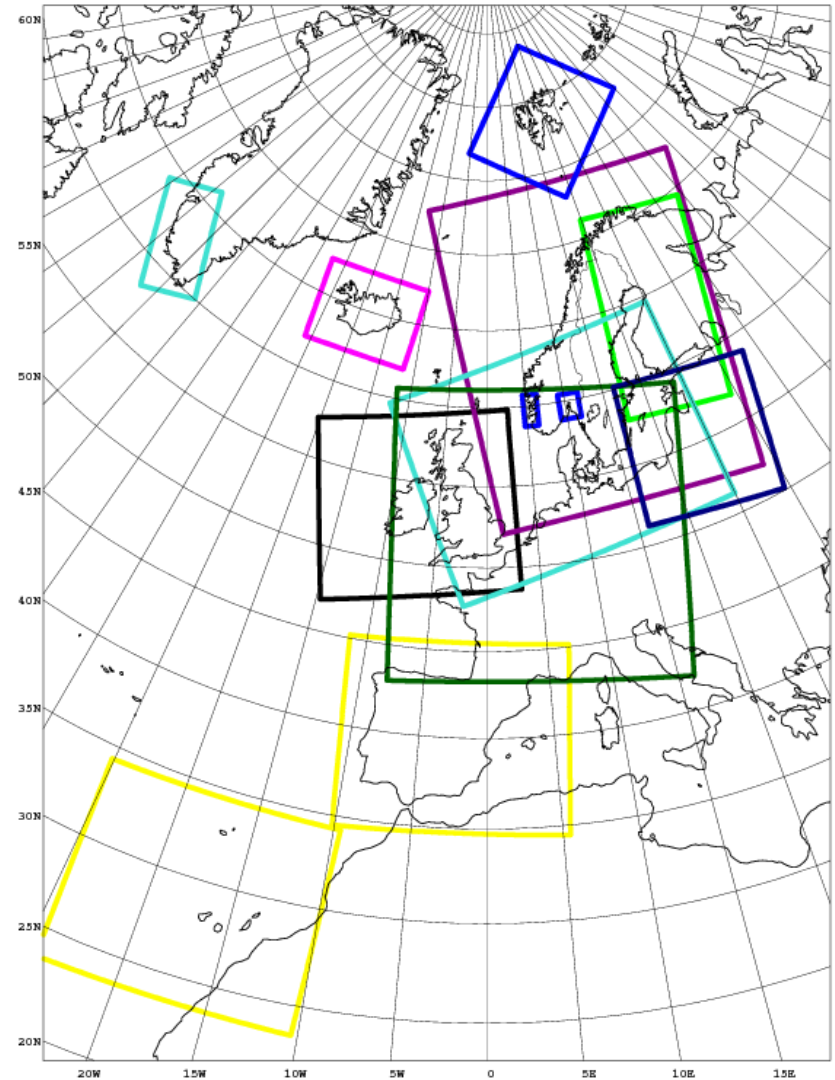
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Daniel Santos, AEMET

**ALADIN - HIRLAM ASW**

Elsinore

13-16<sup>th</sup> April 2015



# Harmonie-38h1.2 released in December 2014

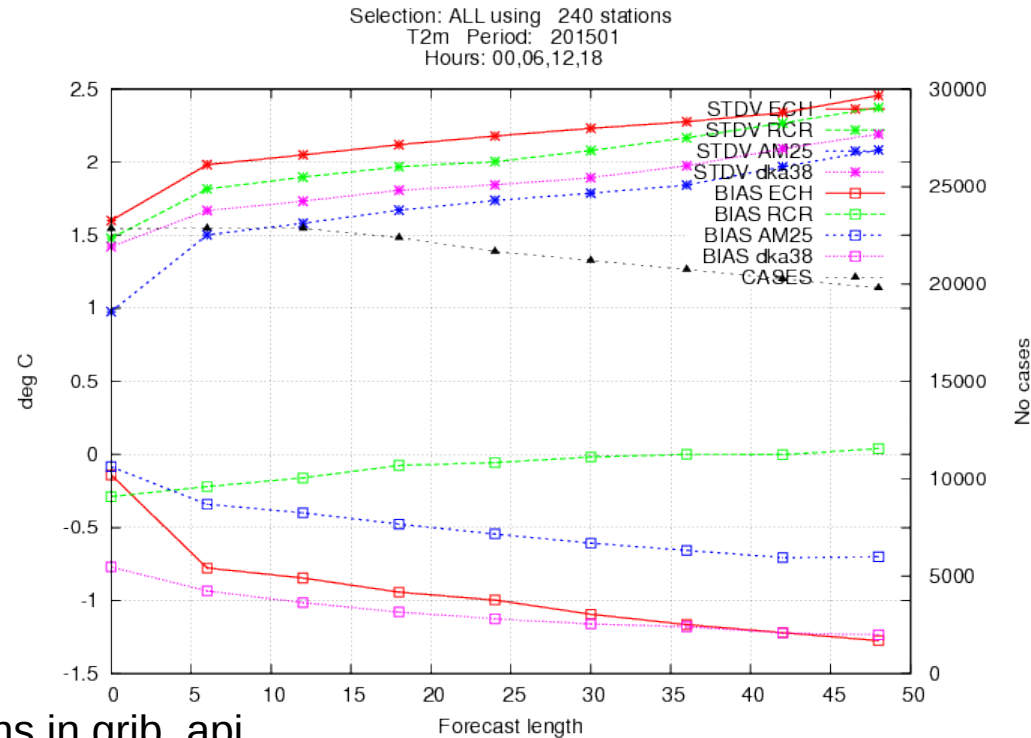
Major changes compared to 38h1.1

- LOCND2 option – mixed clouds
- Radiation corrections
- Dealiasing of vorticity
- Davies relaxation at upper boundary
- New obsmonitor
- Backphasing of parallel FESTAT
- ... much more

No switch to `gl_grib_api` due to limitations in `grib_api`

No ECFLOW

[https://hirlam.org/trac/wiki/Harmonie\\_38h1](https://hirlam.org/trac/wiki/Harmonie_38h1)



DMI38h1.1

MetCoOP38h1.2

Domain	Cycle	Lev	DA	Observations	Cycling
AEMET	<b>38h1.2</b>	65	<b>3DVAR</b> + surf	CONV	48h/4times
DMI	<b>38h1.2</b>	65	3DVAR+ surf	CONV, AMSUA, AMV, MHS, MODE-S	52h/8times
FMI	<b>38h1.2</b>	65	3DVAR + surf	CONV	54h/8times
IMO	<b>38h1.1</b>	65	Blend + surf	CONV	48h/4 times
KNMI	36h1.4.bf1	60	3DVAR + surf	CONV(MODE-S)	48h/8 times
LHMS	37h1.2	60	Blend + surf	CONV	54h/4 times
MetCoOp	<b>38h1.2</b>	65	3DVAR + surf	AMSU-A AMSU-B, <b>GPS</b>	66h at 00,06,12,18, 3h at 03,09,15,21
MetEireann	37h1.1	65	Blend + surf	CONV	54h/4 times

## Keeping an eye on the computational cost

The LOCND2 option ( mixed ice/water clouds ) in AROME turned out to be 60-70% more expensive compared to 38h1.1

Intensive optimization work...

- Reduce number of calls to AROQSATMX
- Reduce EXP/LOG calls
- Introduce saturation lookup tables
- Replaced iterative solutions with analytical ones
- Call by vector instead of scalar -> less calls to some subroutines

Version	Total time	Time in APL_AROME
LOCND2=F	364	196
LOCND2=T orig	471	327
LOCND2 recode 1	392	235
LOCND2 ESAT tables	365	203
LOCND2 final (new ICECLOUD with arrays)	355	194

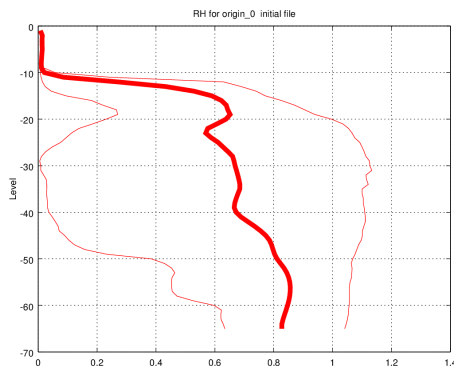
Remark 1: Continue to explore lookup tables in the rest of the AROME physics

Remark 2: 38h1.2 still more expensive due to new dynamics options

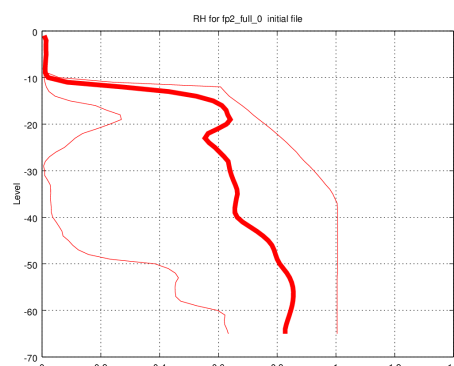
# There are still some bugs left in harmonie-38h1.2...

- Out of bounds in radiation routine, problems in operations for FMI
- Erroneous rotation of wind direction diagnostics (gl)
- Various verification fixes
- ODB error in RADAR assimilation ( solution to be settled )
- Strange surface/soil cooling/heating ( under investigation )
- Loss of humidity in e927, AROME2AROME, interpolation
- Updated in harmonie-38h1 and harmonie-38h1.2.bf branches

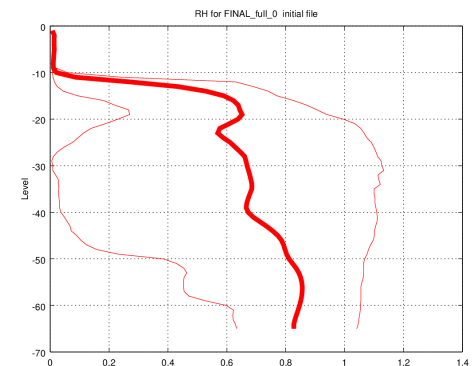
**Input AROME**



**Output LFPQ=F**



**Output with fix in APACHE  
FPRHMAX=2.0 (>1.0)**



## Harmonie-40h1 taking form

**Based on CY40T1 + bf1-3 which contains**

- **Surfex V7.3**
- **Flow-dependent SL interpolations**
- **Introduction of sub-grid precipitation**
- **Vertical Finite Elements code for NH/LAM+global**
- **Optimisation in PREP**
- **ALARO-1**
- **FULLPOS 2**
- **Much more ...**

**Things only in the h-version**

- **Dealiasing of vorticity**
- **Upper LBC**
- **LOCND2**
- **SODA inline Canari**
- **Various observation handling**
- **...**

**Introduced in cy41t1 or will be introduced in cy42t1**

**[https://hirlam.org/trac/wiki/Harmonie\\_40h1](https://hirlam.org/trac/wiki/Harmonie_40h1)**

# Running HARMONIE under ECFLOW

courtesy Daniel Santos, AEMET

Recent integration to harmonie-40h1

Harmonie start ... SCHEDULER=ECFLOW

Suitable for

- Climate runs
- RE-analysis runs
- Operational runs

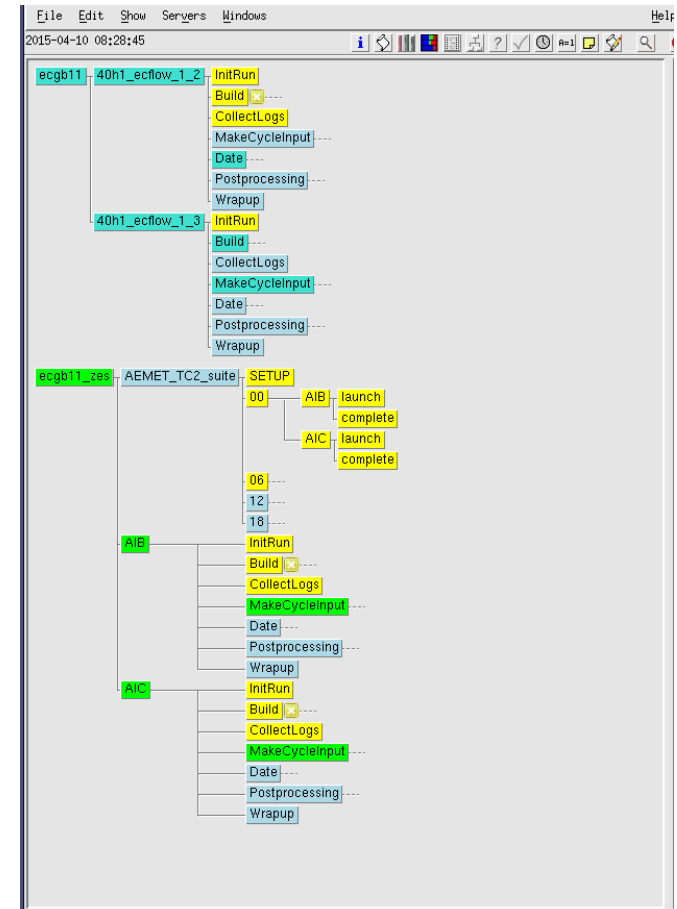
Easy to monitor several suites

Faster graphical interface

mSMS will still be kept and supported

Wiki documentation on the way

Only tested at ECMWF

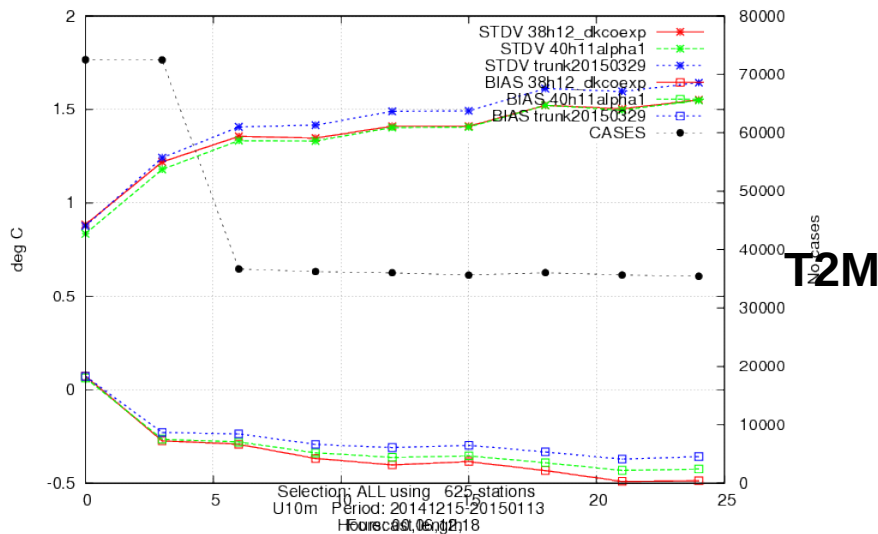


/home/ms/spsehlam/hlam/harmonie\_release/branches/harmonie\_40h1\_ecflow

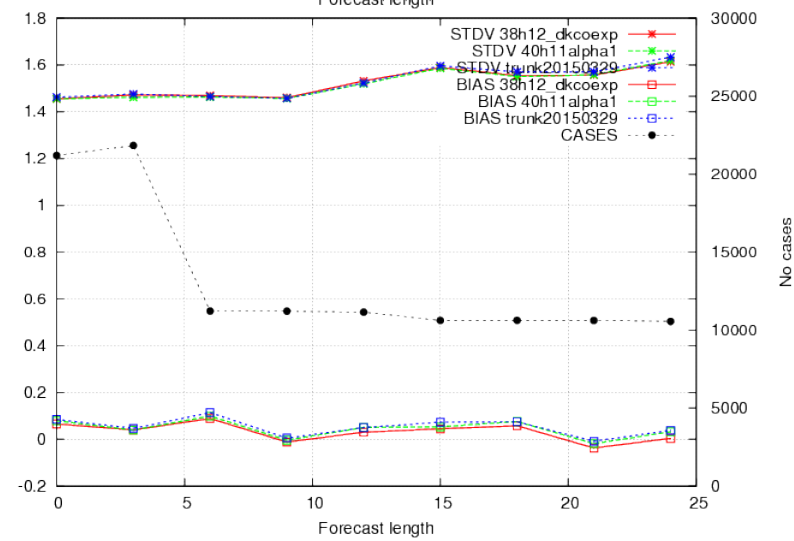
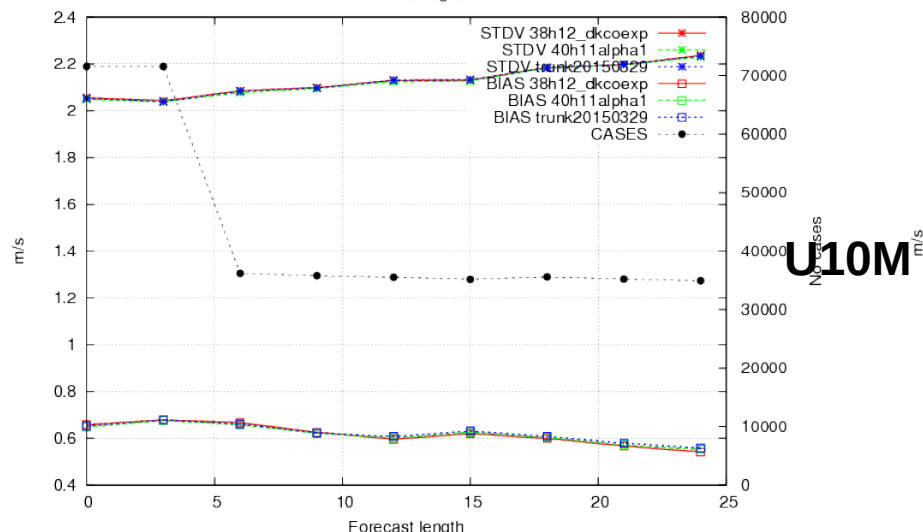
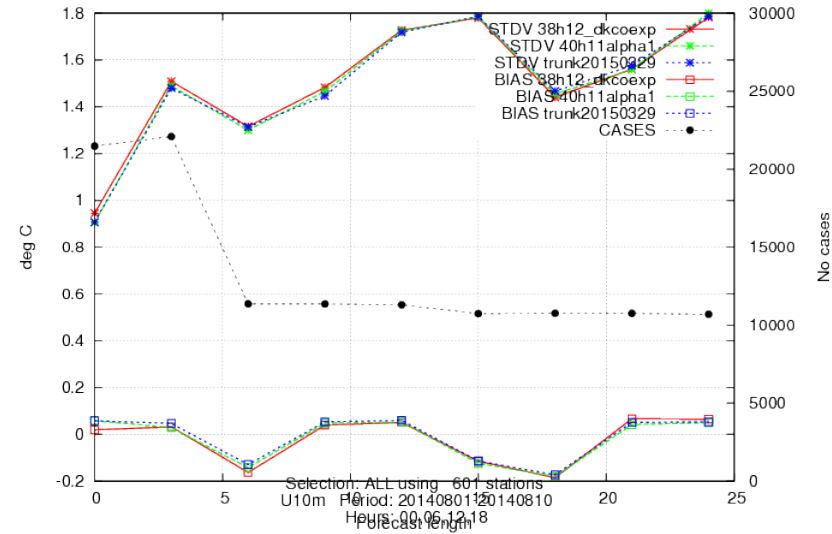


# Health check of cy40h1 scores

**WINTER**  
 Selection: ALL using 625 stations  
 U10m Period: 20141215-20150113  
 Hours: 00,06,12,18



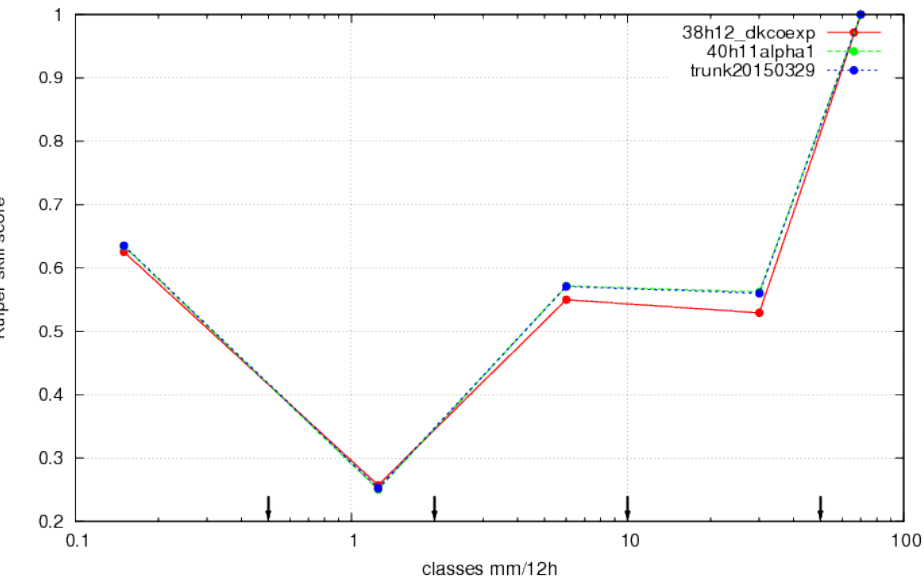
**SUMMER**  
 Selection: ALL using 601 stations  
 U10m Period: 20140801-20140810  
 Hours: 00,06,12,18



# Health check of cy40h1 scores

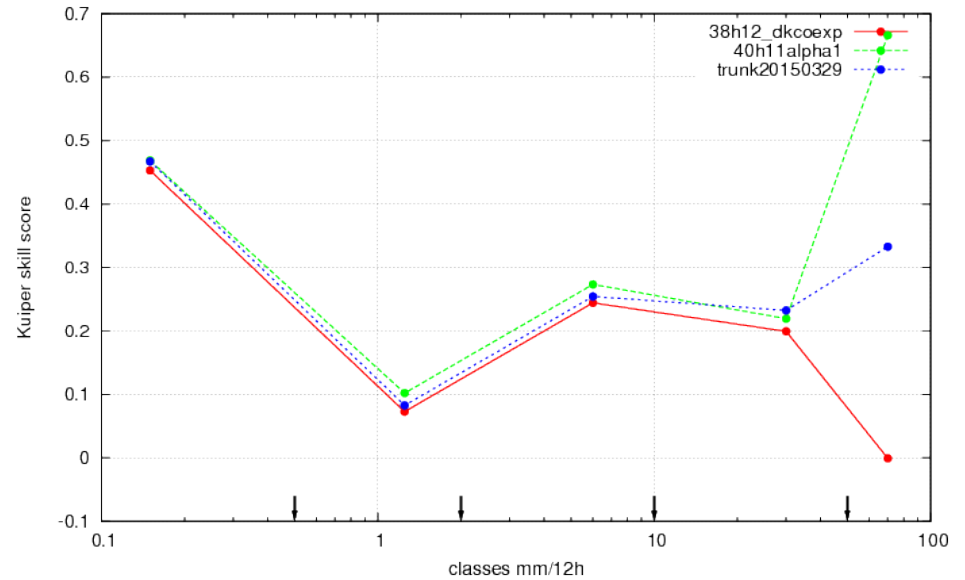
## WINTER

Kuiper skill score for 12h Precipitation (mm/12h)  
 Selection: ALL 527 stations  
 Period: 20141215-20150113  
 Used 00,12 + 18-06



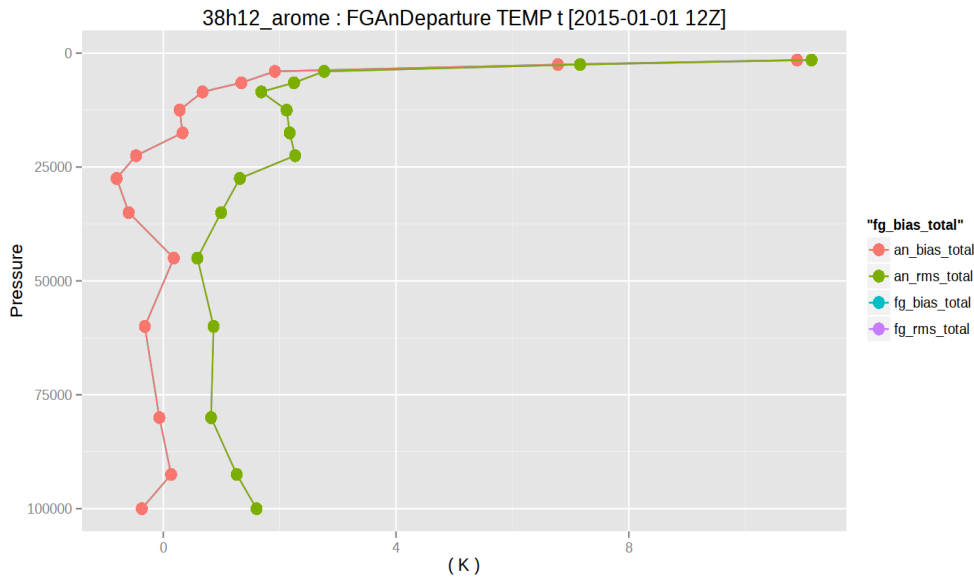
## SUMMER

Kuiper skill score for 12h Precipitation (mm/12h)  
 Selection: ALL 514 stations  
 Period: 20140801-20140810  
 Used 00,12 + 18-06

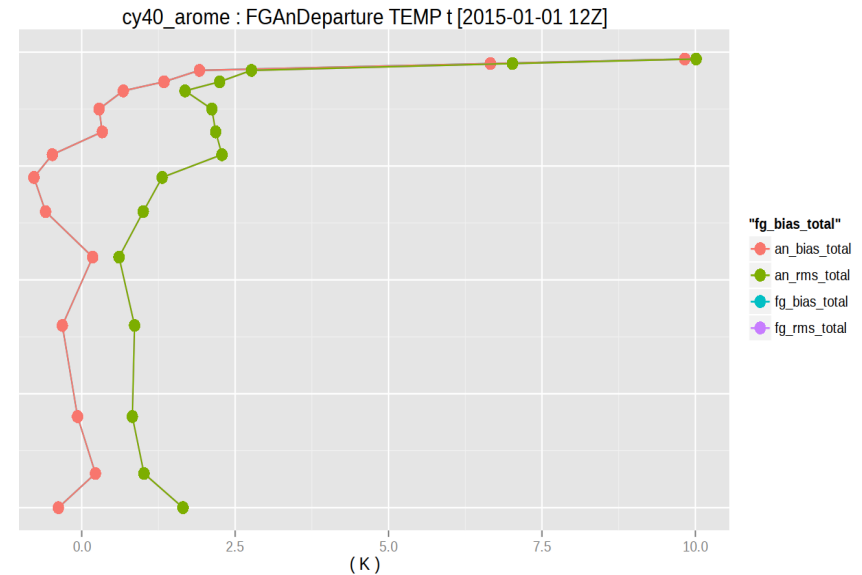


# Health check of cy40h1 assimilation

38h12



40h1



Radiance assimilation healthy

Still problems in CANARI ( under investigation )

## Other changes in or to appear in Harmonie-40h1.1

- **Initialisation of SURFEX fields from ECMWF data through PREP ( SURFEX\_PREP=yes)**
- **Radiation changes**
- **Optional ECFLOW scheduler**
- **Support for boundaries on pressure levels**
- **HarmonEPS developments**
- **Climate branch changes**
- **ALARO1 interface to SURFEX V7.3**
- **Enhanced obsmonitoring**

**Tentative content**

**Qubic grid**

**4DVAR for AROME**

**ALADIN wishlist?**

**...**

Harmonie-40h1.1.alpha.1 available

Next alpha/beta version to be released during April/May

**There will be no Harmonie-40h1.2**

A new call for HARMONIE RCR  
(Regular Cycle with the Reference)

- **Call for new RCR centres for every QA cycle.**
  - Shorten the way between research and operations
- **First call for cy38h1**
  - DMI and MetCoOp
- **New call for cy40h1**
  - Similar configuration, but with a focus on HarmonEPS

## Future cycles

ECMWF/MF	MF	HIRLAM	Declaration
		40h1.1	Autumn 2015
	CY41T1		March 2015
CY42			March-June 2015
	CY42T1		October-December 2015
		42h1	2016
CY43			April-June 2016

- Large structural changes to expect in CY42/CY43
- There will be no Harmonie-41h1

## Swell from Bratislava ( and earlier common efforts )

- **Mixed success with the full installation of Harmonie**
- **Verification and extraction software implemented in ALADIN countries**
  - Several bugfixes and improvements thanks to feedback
  - Pending T2M MIN/MAX accumulation inconsistency problem
  - Poor fldextr speed reported (example from Oldrich Spaniel)
    - 38h1: 50s
    - 40h1 1 thread: 23s
    - 40h1 8 threads: 14s
- **FA2GRIB conversion and postprocessing tool (gl)**
  - Increased flexibility for local tables
  - Interest for GRIB2?
  - FA2NETCDF conversion from climate branch
  - IO-server splitted files to single GRIB file in one go

## MUSC@40h1

## Harmonie Training

### MUSC – The single column model

- A branch exists in the repository
  
- Simple examples for extracting initial/forcing data from a 3D run
  - AROME
  - ALARO
  - ALARO + SURFEX

- In Norrköping in September
  
- Are there enough interested participants?
  
- Training for last year available online

<https://hirlam.org/trac/wiki/HarmonieSystemTraining2014/Programme>



Thanks for your attention!

What about this new name for the common system?

**U**nified

**L**imited area model

**F**ramework